

REMARKS

The Office Action of April 17, 2006, has been received and reviewed.

Claims 1-14 are currently pending and under consideration in the above-referenced application. Each of claims 1-14 stands rejected.

Reconsideration of the above-referenced application is respectfully requested.

Rejections under 35 U.S.C. § 103(a)

Claims 1-14 have been rejected under 35 U.S.C. §103(a).

The standard for establishing and maintaining a rejection under 35 U.S.C. § 103(a) is set forth in M.P.E.P. § 706.02(j), which provides:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Sommer in View of Sahota

Claims 1-14 are rejected under 35 U.S.C. § 103(a) for being drawn to subject matter that is allegedly obvious in view of the subject matter taught in U.S. Patent 6,561,871 to Sommer (hereinafter "Sommer") and teachings from U.S. Patent 5,665,199 to Sahota et al. (hereinafter "Sahota").

Sommer teaches a linear drive mechanism for chemical-mechanical planarization. Col. 3, lines 53-56. A substrate carrier 402 carries a substrate (not shown) against a polishing surface of CMP apparatus. Col. 12, lines 8-11; FIG. 11. The carrier plate 402 has several magnets 420, 422, 424, and 426 that facilitate incremental movement of the carrier plate 402 in the X and Y directions (see, e.g., U.S. Patent 3,376,578 referenced and incorporated into Sommer) while providing an attractive force F in the Z direction between the carrier plate 402 and the polishing

plate 406. Col. 28-30; FIGS. 11, 13. Alternatively, the magnets 520, 522, 524, and 526 may be permanently mounted in the platen 531. Col. 15, lines 47-53; FIG. 15.

While the magnets of the apparatus disclosed in Sommer include protruding regions, the protruding regions appear to have fixed heights. *See, e.g.*, col. 12, lines 23-40; FIGS. 12, 14, and 16. Moreover, it does not appear that the protruding regions of the magnets taught in Sommer may be moved independently from one another. *See, e.g., id.* Therefore, it appears that the apparatus disclosed in Sommer is incapable of “applying [a] force gradient to a backside of at least one second semiconductor device structure...”

Sahota teaches methods for developing polishing processes that are tailored to specific types of material layers. The methods of Sahota are used to improve planarity of the polished layers. The tailoring techniques disclosed in Sahota are limited use of conventionally configured polishing pads and substrate supports, in which there is no application of different amounts of pressure to either the pad or the substrate. Rather, it is the duration of the polishing process that is tailored.

Neither Sommer nor Sahota teaches or suggests a method in which a force gradient is generated or applied during polishing—either on the basis of topographical analysis or otherwise. Therefore, Sommer and Sahota do not teach or suggest each and every element of independent claim 1.

Furthermore, neither Sommer nor Sahota teaches or suggests selectively applying increased amounts of pressure to at least two locations on a backside of a semiconductor device structure, let alone to locations that correspond to raised locations on an active surface of the semiconductor device structure, following analysis of a topography of a surface of another semiconductor device structure. As such, neither Sommer nor Sahota, taken together or separately, teaches or suggests each and every element of independent claim 8.

It is also respectfully submitted that, without the benefit of hindsight that the claims of the above-referenced application provide to the Office, one of ordinary skill in the art wouldn’t have been motivated to combine teachings from Sommer and Sahota in the manner that has been asserted by the Office. Specifically, as neither Sommer nor Sahota teaches or suggests a method in which a pressure gradient is generated and applied (independent claim 1) or a method in which

increased amounts of pressure are applied to at least two locations on a back side of a semiconductor device structure, it is respectfully submitted that there could have been no motivation for one of ordinary skill in the art to incorporate such a process into the polishing processes of Sommer or Sahota.

Further, as Sommer and Sahota do not teach or suggest each and every element of either independent claim 1 and independent claim 8, it is respectfully submitted that one of ordinary skill in the art would have had no reason to expect that teachings from these references could be successfully combined in such a way as to result in the methods recited in independent claim 1 or independent claim 8.

Therefore, it is respectfully submitted that the teachings of Sommer and Sahota do not support a *prima facie* case of obviousness against independent claim 1 or independent claim 8. As such, these claims are both directed to subject matter that, under 35 U.S.C. § 103(a), is allowable over the subject matter taught in Sommer and Sahota.

Each of claims 2-7 is allowable, among other reasons, for depending directly or indirectly from independent claim 1, which is allowable.

Claims 9-14 are each allowable, among other reasons, for depending directly or indirectly from independent claim 8, which is allowable.

Chen in View of Sahota

Claims 1-14 stand rejected under 35 U.S.C. § 102(e) for reciting subject matter which is purportedly anticipated by that disclosed in U.S. Patent 6,436,828 to Chen et al. (hereinafter “Chen”), in view of the subject matter disclosed in Sahota. As this rejection is based upon two references – Chen *in view of* Sahota – it is presumed to be an obviousness rejection under 35 U.S.C. § 103(a) rather than an anticipation rejection under 35 U.S.C. § 102(e).

The apparatus of Chen includes a carrier head 100 with a housing 102 and a flexible membrane 104 secured to the housing 102, as well as a plurality of coils...” Col. 4, lines 27-29. The membrane 104 is made from a flexible and elastic material, such as silicone, and includes magnetically sensitive particles distributed uniformly therethrough. Col. 4, lines 45-48. In addition, the apparatus of Chen includes a pressurizable loading chamber 120 behind the

membrane 104 to apply a downward pressure to the membrane 104 and, thus, to a substrate carried by the carrier head 100. Col. 4, lines 61-67.

Initial downward pressure or force in the Z-direction is applied by pressurizing the loading chamber 120. Since the membrane 104 is elastic, substantially equal amounts of pressure are applied by the membrane 104 to all areas of the surface of a substrate carried by the carrier head 100. The force in the Z-direction is then varied by energizing the magnetic coils in the housing above the flexible membrane, canceling part of the downward force applied by the pressure in the load chamber. Col. 6, lines 32-41. The magnetic coils are annular, as shown in FIG. 3, and, as such, will only generally affect an inner, a center, and an outer region of the membrane 104, and not finite areas on the membrane 104. Moreover the since the membrane 104 is secured to the housing 102, the magnetic force must overcome both the pressure in the load chamber 120 and the sheer of membrane 104 itself before any reduction of force to the outside region of the substrate could be accomplished. This effect is described in reference to FIG. 4, were the change in removal rate is greatest near the “wafer center,” with no change in removal rate near the edge.

It is respectfully submitted that one of ordinary skill in the art wouldn't have been motivated to combine teachings from Chen and Sahota in the asserted manner. Specifically, it is respectfully submitted that Sahota, which teaches analysis of the topography of a semiconductor device structure to develop a polishing process that improves planarity of a material layer, discloses that tailoring a duration of polishing is sufficient for performing the desired task. Thus, use of the complex device of Sahota in combination with the analysis technique of Sahota would only serve to complicate the polishing process. Due to this apparently unnecessary complication, it appears that the asserted combination was based solely upon impermissible hindsight.

Moreover, it is respectfully submitted that neither Chen nor Sahota teaches or suggests each and every element of independent claim 1 or independent claim 8.

With respect to the subject matter recited in independent claim 1, as amended and presented herein, it is respectfully submitted that neither Chen nor Sahota teaches or suggests generating a force gradient that includes a plurality of immediately adjacent, distinctly different amounts of pressure. Rather, Chen's teachings are limited to generating a gradient in which

immediately adjacent pressures are largely indistinct from one another, while Sahota lacks any teaching or suggestion that any type of force gradient may be applied.

As for the subject matter to which independent claim 8, as amended and presented herein, is directed, Chen and Sahota lack any teaching or suggestion of selectively applying distinctly increased amounts of pressure, relative to immediately adjacent areas of a semiconductor device structure, to at least two locations on a backside of the semiconductor device structure. Again, the teachings of Chen are limited to applying gradual, largely indistinct amounts of pressure to immediately adjacent locations.

In view of the foregoing, it is respectfully submitted that the teachings of Chen and Sahota do not support a *prima facie* case of obviousness against independent claim 1 or independent claim 8.

Therefore, under 35 U.S.C. § 103(a), the subject matter recited in each of independent claims 1 and 8 is allowable over the subject matter taught in Chen and Sahota.

Claims 2-7 are each allowable, among other reasons, for depending directly or indirectly from independent claim 1, which is allowable.

Each of claims 9-14 is allowable, among other reasons, for depending directly or indirectly from independent claim 8, which is allowable.

Withdrawal of the 35 U.S.C. § 103(a) rejections of claims 1-14 is respectfully solicited, as is the allowance of these claims.

CONCLUSION

It is respectfully submitted that each of claims 1-14 is allowable. An early notice of the allowability of each of these claims is respectfully solicited, as is an indication that the above-referenced application has been passed for issuance. If any issues preventing allowance of the above-referenced application remain which might be resolved by way of a telephone conference, the Office is kindly invited to contact the undersigned attorney.

Respectfully submitted,



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